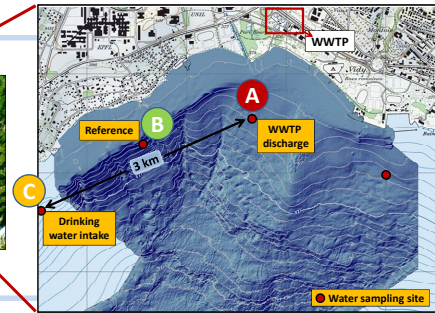
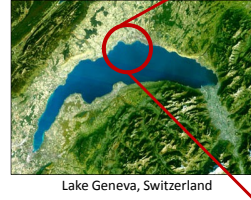


MICROPOLLUTANT PLUME IN LAKE GENEVA

INTRODUCTION

- A** Direct discharge of effluent wastewater into Vidy Bay (ca. 100'000 m³/day)
- BUT, even after treatment, effluent wastewater may contain **MICROPOLLUTANTS** such as **pharmaceuticals** and **pesticides**
- C** 3 km downstream, a **drinking water plant** pumps lake water (ca. 100'000 m³ /day) for potable water (sand filter system).



QUESTIONS

Micropollutants in Vidy Bay?

Which ones? Where? When? Why? How much? Risks?

METHODS

Field



- Monthly sampling at different sites and depths in Vidy Bay (April 2010- January 2011)

Lab



- SPE extraction and analysis by UPLC-MS/MS for 39 micropollutants (pharmaceuticals and pesticides)

SOME ANSWERS...

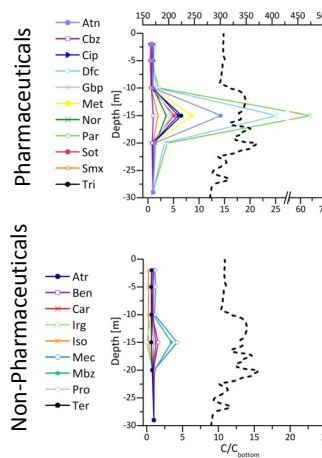
Which ones? How much?

- 32 of 39 targeted micropollutants detected in the majority of lake samples (over 200 samples)
- Background concentrations in lake generally < 20 ng/L
- Straight concentration depth profiles at REF **B**

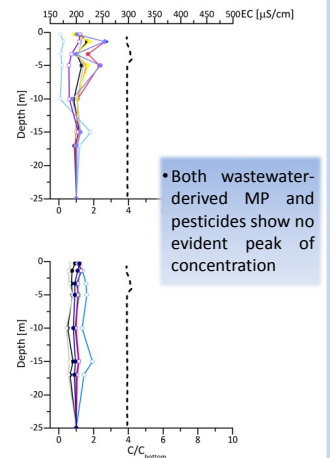
Where? When?

Concentrations detected above WWTP discharge **A**

Typical stratified profile (SUMMER)



Typical unstratified profile (WINTER)



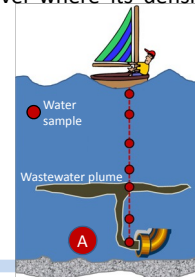
Risks?

- Potential ecotoxicological risk for 3 antibiotics, but only in the vicinity of WWTP discharge
- Observed concentrations at REF do not present an ecotoxicological risk.
- Concentrations detected in raw drinking water do not present human health risk

Why?

Discharged wastewater will rise to a level where its density corresponds to that of surrounding water column.

In summer, thermal stratification prevents vertical mixing of the water column and **wastewater plume remains below thermocline.**



In winter, no density stratification → enhanced mixing of water column → **no plume** (or small surface plume)

...MORE ANSWERS:

Bonvin et al., ES&T, 2011 (in press)

CONCLUSIONS

- **WWTP** is likely the **main source of most pharmaceuticals** in the Bay
- Main source of pesticides is not the WWTP, but likely surface runoff
- **Plume of micropollutants**, with high MP concentrations, observed during **stratified periods** at WWTP discharge
- Conductivity may be used to **predict concentrations** of waste-water derived MPs
- **No ecotoxicological risk** of observed concentrations away from **A**

THANKS TO...

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